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GB 2018924 A GB 1362150 A GB 1001248 A

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INT CL[5] F16J 15/12, F16L 37/084

(54) Push-fit pipe joints and gaskets therefore

(57) A gasket 7 for a spigot and socket joint 1 and a spigot and gasket joint 1 incorporating such a gasket 7 wherein gasket 7 is of single hardness rubber and incorporates a plurality of metal inserts 11 around its periphery, inserts 11 being located at least predominantly in the nose 8 of the gasket and having a magnitude, in cross section of the gasket, constituting a substantial part of the magnitude of the cross section of the nose of the gasket, inserts 11 engaging partly around the protrusion 5 of the bottom of the groove 4 of the socket 2 and with the inner surface of the terminal flange 6, and with the base of groove 4 therebetween, and protruding to the radially inner surface 9 of gasket 7 still within or substantially within nose portion 8 of gasket 7 and having at least one tooth 14, 15 arranged to lie at or adjacent to the surface of gasket 7 at said radially inner surface 9.

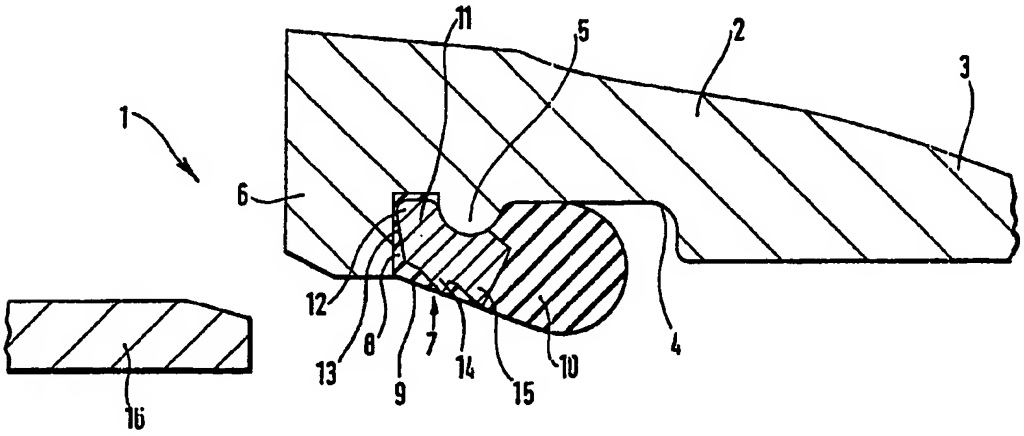

FIG.1.

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1990.

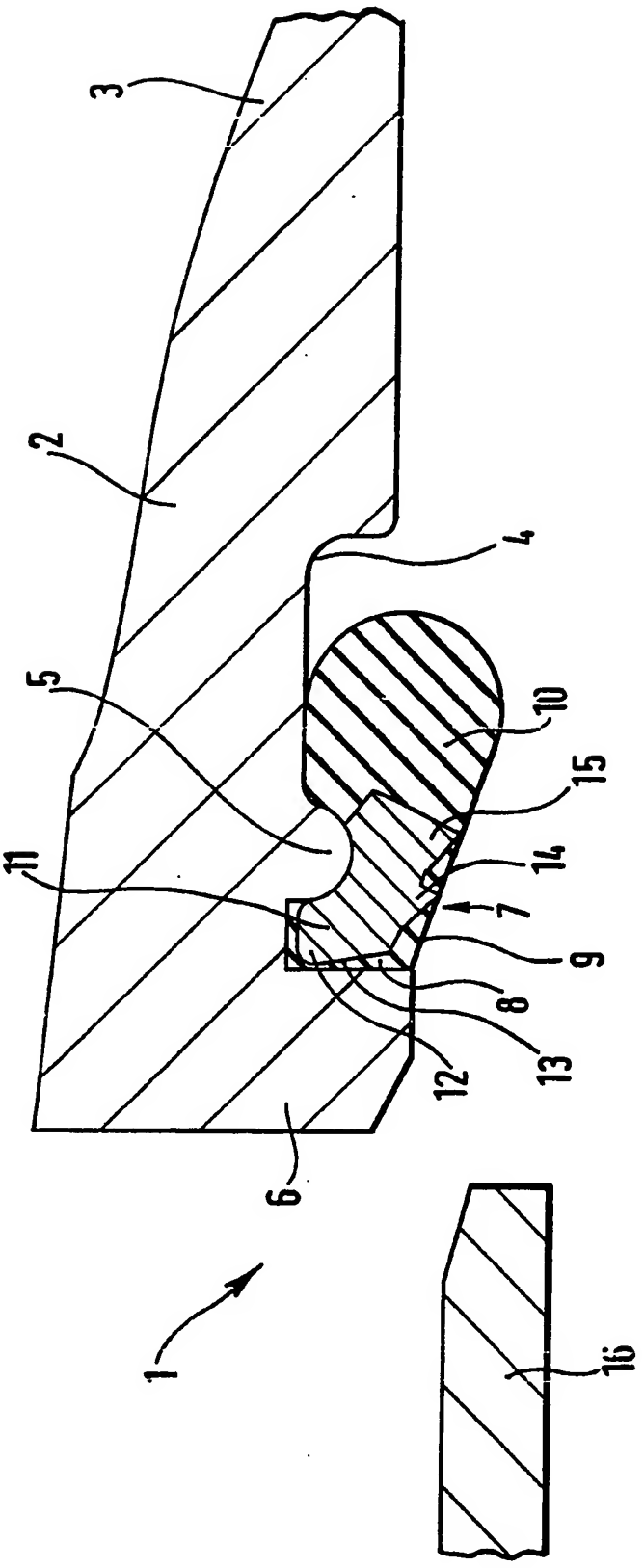

FIG.1.

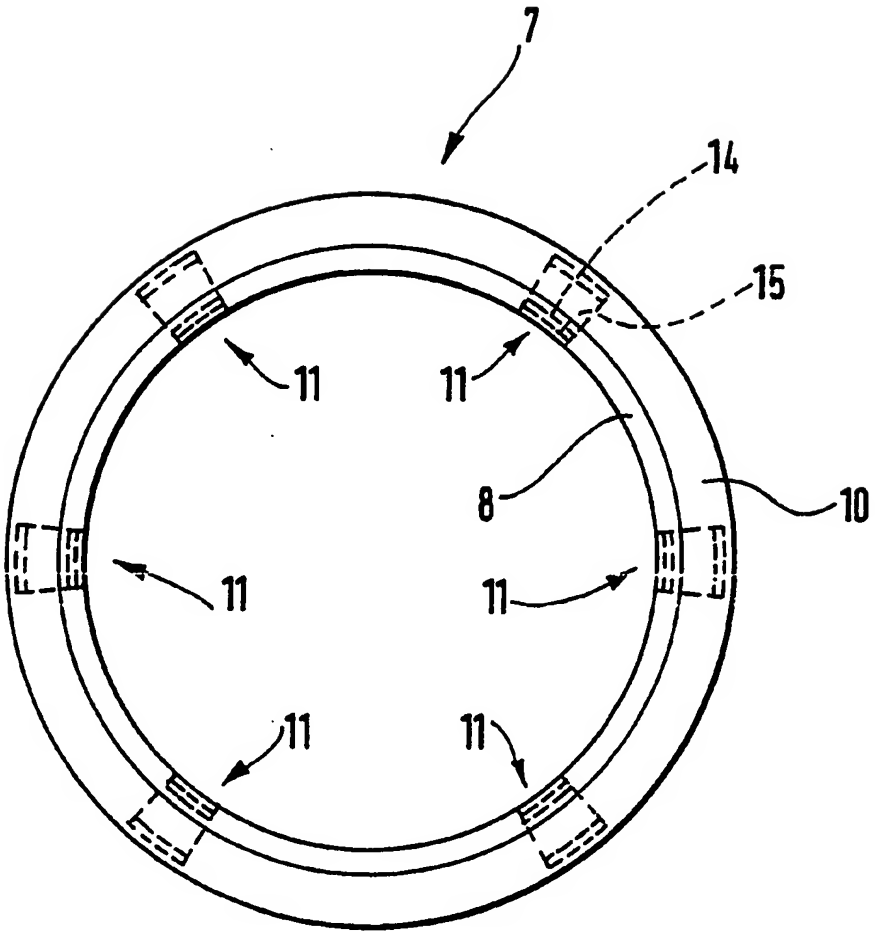

FIG. 2.

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Pipe Joints and Gaskets Therefor

This invention relates to pipe joints and couplings and parts therefor, and more particularly relates to spigot and socket joints between two adjacent pipes, and annular sealing members or gaskets (located in use in an internal annular groove around the socket) for such pipe joints.

It is to be understood that the socket portion of the joint may be comprised by a sleeve member open at both ends and having a socket portion at both ends, into which double spigot ended pipes are inserted for connection, although with the particular pipe joint type to which the invention is especially applicable such an arrangement of

separate socket couplings is not usually used.

Additionally it is to be understood that the expression "pipes" as used herein means pipes and tubes as such and also pipe-like members and fittings for use in pipework such as bends, elbows, "T" connectors and parts of devices adapted to be fitted into pipework, such as valves and pumps.

The invention is especially concerned with the type of spigot and socket pipe joint known as "TYTON" (registered trade mark).

In a "TYTON" pipe joints (hereinafter referred to as "a joint of the type described"), the socket carries around its radially inner wall adjacent its open mouth a groove immediately behind a radially inwardly extending terminal flange, the groove being provided around its inner periphery with an inward protrusion of curved section disposed between a quarter and a third of the distance along the grooves length axially inwardly of the socket. Additionally the groove is provided with an annular gasket of resilient elastomeric material (hereinafter called "rubber" for convenience although artificial elastomers can and are often utilised) arranged to be seated within the groove behind the radially inwardly projecting annular flange, and, by means of an appropriate annular slot in its outer periphery, over the radially inner annular protrusion. In practice the protrusion engages in the gasket some one third down the

gasket's axial length, and the gasket is of such dimensions that its inner diameter is, in its relaxed state, significantly less than the inner diameter of the terminal flange of the socket.

Despite attempts to produce a successful single hardness rubber gasket (to reduce the cost of manufacture), this has hitherto been, for practical necessity (as explained hereafter) of dual hardness, the harder portion being adjacent the axially outer end, or nose, thereof approximately from its position of engagement with the protrusion, to the engagement thereof with the inwardly directed terminal flange, whilst the softer portion of the gasket is comprised by the remaining two thirds, or main body, which extends, in lozenge-like configuration in section (in its relaxed state) axially inwardly of the joint and radially inwardly of the internal diameter of the socket whilst abutting along its radially outer surface on the base of the groove around the socket.

In the formation of a joint of the type described, a pipe spigot is inserted into the open end of the socket and firstly bears upon the harder nose portion of the gasket where it is located behind the terminal flange of the socket, upon the base of the groove, and upon the protrusion thereof, the radially outwards compressive force from the spigot firmly and positively locating the nose of the gasket with its essentially harder rubber

against any sliding within or turning movement out of the groove of the socket. Further movement of the spigot into the socket brings about the engagement of the outer periphery of the spigot with the essentially softer rubber main body portion of the gasket which is thereby compressed radially outwardly between the spigot and the socket to perform a satisfactory sealing function.

Pipe joints of the kind described have been widely used over many years because of their reliability with pipes carrying various gaskets and liquids at high pressure. Similarly joints of the kind described provided with gaskets having facility for joint locking as hereinabove described have been used successfully for some years.

However a significant disadvantage of such joints of the type described and as hereinabove mentioned has been the practical need to use double hardness rubber for the gasket because of its effectiveness in assuring correct assembly of the joint without disturbance of the gasket, whilst providing satisfactory sealing. Although various attempts have previously been made to provide a single hardness rubber, thereby providing a cheaper gasket and joint, no previous attempt has been totally satisfactory.

It is an object of the present invention to overcome or at least substantially reduce the above mentioned disadvantage and problem.

In accordance with one aspect of the present

invention there is proved a spigot and socket joint of the type described wherein the gasket is of single hardness rubber and incorporates a plurality of metal inserts around its periphery, the inserts being located at least predominantly in the nose of the gasket and having a magnitude, in cross section of the gasket, constituting a substantial part of the magnitude of the cross section of the nose of the gasket, the inserts engaging partly around the protrusion of the bottom of the groove of the socket and with the inner surface of the terminal flange, and with the base of the groove therebetween, and protruding to the radially inner surface of the gasket still within or substantially within the nose portion of the gasket and having at least one tooth arranged to lie at or adjacent to the surface of the gasket at said radially inner surface.

In accordance with another aspect of the present invention there is provided a gasket for a spigot and socket joint of the type described, the gasket being of single hardness and incorporating a plurality of metal inserts around its periphery, the inserts being located at least predominantly in the nose of the gasket and having a magnitude, in cross section of the gasket, constituting a substantial part of the magnitude of the cross section of the nose of the gasket, the inserts engaging partly around the protrusion of the bottom of the groove of the socket and with the inner surface of the terminal flange, and

with the base of the groove therebetween, and protruding to the radially inner surface of the gasket still within or substantially within the nose portion of the gasket and having at least one tooth arranged to lie at or adjacent to the surface of the gasket at said radially inner surface.

In practice, insertion of a spigot into a socket causes a locating compression of the toe portion of the gasket as explained hereinafter gasket and sealing from the main body portion thereof. In addition the tooth or teeth of each of the metal inserts engages or nearly engages the outer periphery of the spigot. Any attempt to remove the spigot will tend to rotate each of the metal inserts about the protrusion at the bottom of the groove in the inner wall of the socket so that the tooth or teeth tend to project radially inwardly into the socket and engage sharply with the outer periphery of the spigot, thereby preventing removal of the spigot.

Whereas typically a gasket for a joint of the type described of dual hardness has had toe hardness of the order of 80 IRHD (what do these initials mean please?), whilst the main body has a hardness of the order of 55 IRHD, we have found in a preferred form of the invention satisfactory operation with retention of the gasket toe within the socket groove with gaskets using the single hardness of rubber of between 50 and 70 IRHD.

We have found that, surprisingly, not only do the

metal inserts provide a locking facility to the joint of the kind described, but most satisfactorily act to "stiffen" the toe of the gasket to retain it in place as required in the groove in the pipe socket as a spigot is inserted into the socket past the gasket. Indeed we have found that a gasket of 60 IRHD has out-performed in tests dual hardness gaskets in joints of the type described even when such dual hardness gaskets incorporate inserts for locking facility purposes as hereinabove described.

In order that the invention may be more readily understood, one embodiment thereof will now be described by way of example with reference to the accompanying drawing in which:

Figure 1 is a schematic sectional side elevation of part of a joint of the type described in accordance with the invention prior to assembly; and

Figure 2 is a front elevation of the gasket of Figure 1.

Referring now to the drawings it will be seen that the joint 1 is of the type described and comprises a socket 2 of known configuration formed integrally on the end of a pipe 3. The socket 2 has an annular groove 4 running around the inner wall thereof and has on its base a protrusion 5, generally semi circular in section, approximately between a quarter and one third of the distance along the groove 4. The groove 4 is closed at the front open end of the socket by a radially inwardly

extending terminal flange 6 which additionally constitutes the axially front wall of the groove 4.

Disposed within the groove 4 in the socket 2 is an annular gasket 7 of single hardness composition elastomer of 60 IRHD. The gasket has a solid nose portion 8 substantially filling the groove 4 up to and just behind the annular protrusion 5 from the base of the groove 4. The radially inner wall 9 of the gasket has, at its axially front end , an internal diameter corresponding generally to that of the internal diameter of the terminal flange 6 of the socket. The wall 9 tapers axially and radially inwardly from its front end. Axially behind the protrusion, the main body portion 10 of the gasket is of a lozenge or lobe configuration in section.

A plurality of metal inserts 11 are embedded around the periphery of the gaskets, each being so shaped that the nose portion 12 thereof fits into the corner between the base of the groove 4 and the axially inner wall of the terminal flange 6 of the socket, the wall 13 of each insert transverse to the axis of the socket 2 being inclined to the inner axial wall of the terminal flange.

In addition the insert 7 is so shaped as to curve around the protrusion 5 in the base of the groove, and each insert has two teeth 14, 15 at the radially inner edge thereof which lie at or closely adjacent to the inner peripheral wall of the gasket.

Upon insertion of a spigot 16 into the socket, the

nose portion 8 of the gasket 7, due to the presence of the multiplicity of inserts 7, and despite its relative softness, is held firmly in place in the groove 4 between the terminal flange 6 of the socket, the base of the groove 4, and the semi circular protrusion 5 on the base of the groove, all these being surfaces where the inserts 7 have a significant holding presence. As a consequence, on insertion of the spigot 16, the nose portion 8 of the gasket 7 is firmly held against any significant risk of sliding or turning axially inwardly of the socket upon continuing frictional strain applied by the external periphery of the spigot 16 as it is moved to its full engagement position within the socket.

As the spigot passes the bulbous main body portion 10 of the gasket 7, this is compressed radially outwardly so as to form a seal between the spigot 16 and the socket 2. Additionally, during insertion of the spigot, some engagement between the teeth 14, 15 of the insert and the outer wall of the spigot 16 occurs Any subsequent attempt to remove the spigot 16 by pulling from the mouth of the socket 2 will cause the teeth 14, 15 to bite into the outer periphery of the wall of the spigot 16 and turn slightly the inserts 7 about the protrusion 5 until its wall 13 transverse to the axis of the socket lies tightly along side the equivalent inner wall of the terminal flange 6. In this disposition, the engagement of the teeth 14, 15 with the spigot peripheral wall is of such strength

that the spigot 16 is successfully restrained from movement from the socket 2.

The gasket may be injection moulded with the plurality of inserts in situ, ensuring good bonding therebetween.

It is to be noted that the moulding of the gasket may leave the edges of the teeth 14, 15 immediately below the surface of the gasket where their locking effect is still perfectly satisfactory.

The applicants have found surprisingly that the presence of the plurality of inserts disposed within the gasket enables a gasket of appropriate compressibility for sealing by the bulbous portion 10 of its body to be firmly located and positively held in the front portion of the groove 4 in the socket, thereby leading to the possibility of a less expensive but effective locking gasket for a joint of the type described.

It is to be understood that the foregoing is merely exemplary of pipe joints and gaskets therefor in accordance with the invention and modifications can readily be made thereto without departing from the true scope of the invention.

CLAIMS

1. A gasket for a spigot and socket joint of the type described, the gasket being of single hardness and incorporating a plurality of metal inserts around its periphery, the inserts being located at least predominantly in the nose of the gasket and having a magnitude, in cross section of the gasket, constituting a substantial part of the magnitude of the cross section of the nose of the gasket, the inserts engaging partly around the protrusion of the bottom of the groove of the socket and with the inner surface of the terminal flange, and with the base of the groove therebetween, and protruding to the radially inner surface of the gasket still within or substantially within the nose portion of the gasket and having at least one tooth arranged to lie at or adjacent to the surface of the gasket at said radially inner surface.

2. A gasket as claimed in claim 1 wherein the hardness thereof is between 50 and 70 IRHD.

3. A gasket as claimed in claim 2 wherein the hardness thereof is of the order of 60 IRHD.

4. A gasket as claimed in any one of the preceding claims wherein the gasket, in addition to the nose thereof

within which the inserts are at least predominantly located, includes a main body portion extending from the nose portion and having a lozenge or lobe configuration in section arranged in use to provide sealing of the spigot and socket joint.

5. A spigot and socket joint of the type described wherein the gasket is of single hardness rubber and incorporates a plurality of metal inserts around its periphery, the inserts being located at least predominantly in the nose of the gasket and having a magnitude, in cross section of the gasket, constituting a substantial part of the magnitude of the cross section of the nose of the gasket, the inserts engaging partly around the protrusion of the bottom of the groove of the socket and with the inner surface of the terminal flange, and with the base of the groove therebetween, and protruding to the radially inner surface of the gasket still within or substantially within the nose portion of the gasket and having at least one tooth arranged to lie at or adjacent to the surface of the gasket at said radially inner surface.

6. A spigot and socket joint substantially as shown in and as hereinbefore described with reference to the accompanying drawings.

Patents Act 1977 **Examiner's report to the Comptroller under Section 17** **(The Search report)** -13-	Application number GB 9223100.0
Relevant Technical Fields (i) UK Cl (Ed.L) F2B F2G (G21A G31) (ii) Int Cl (Ed.5) F16J 15/12 F16L 37/084	Search Examiner R J DOWNING Date of completion of Search 22 DECEMBER 1993
Databases (see below) (i) UK Patent Office collections of GB, EP, WO and US patent specifications. (ii)	Documents considered relevant following a search in respect of Claims :- 1-6

Categories of documents

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Category	Identity of document and relevant passages		Relevant to claim(s)
Y	GB 2018924 A	(EISENWERKE FRIED WILH DÜKER)	1,4,5
Y	GB 1362150	(SEILER)	1,4,5
Y	GB 1001248	(US PIPE) see page 3, lines 97-100	1,4,5

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